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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,990	03/02/2004	Tsutomo Shoki	Q80214	9533

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EXAMINER	
ROSASCO, STEPHEN D	
ART UNIT	**PAPER NUMBER**
1756	

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/789,990	SHOKI ET AL.	
	Examiner	Art Unit	
	Stephen Rosasco	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/2/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

Claims 7-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Multiple dependent claims cannot be dependent on multiple dependent claims.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by White (6,042,995).

White teaches the claimed invention including employing an inspection film. The defects are preprogrammed and the image of the pattern from the mask is inspected for a multilayer film is such that a portion of the EUV radiation is transmitted through the inspection film, reflected from the multilayer film and back into the inspection film. The exposed inspection film is then developed, and the developed inspection film is inspected to determine if it indicates the presence of defects in the underlying multilayer film.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dettmann et al. (7,045,254) in view of White (6,042,995).

The claimed invention is directed to a reflective mask blank having a programmed defect, comprising a base body comprising a substrate and a reflective multilayer film formed on the base body to reflect exposure light incident to the reflective multilayer film, the base body having a principal surface provided with a base pattern comprising a predetermined irregularity, the reflective multilayer film formed on the base pattern having a principal surface provided with a step portion corresponding to the base pattern so that the reflective multilayer film has the programmed defect.

The applicant discusses the limitations of the prior art in that in the lithography in a short-wavelength region, it is essential to research or evaluate the influence of the phase defect in the mask upon the transferred pattern and to quantitatively inspect the phase defect in production of the mask or the mask blank.

And so that in order to evaluate or inspect the phase defect in the above-mentioned reflective mask, it is necessary to prepare a mask having a programmed defect or a mask blank having a programmed defect in which a phase defect of a predetermined size is preliminarily formed. However, such a reflective mask blank having a programmed defect or such a reflective mask having a programmed defect for use in inspection and evaluation is not known so far. Further, as the phase defect, a microscopic irregularity on the order of several nanometers must be formed. However, any technique for forming such a microscopic phase defect on the reflective multilayer film at a particular position with a particular size is not known.

Dettmann et al. teach a product mask for fabricating a semiconductor structure with phase shift mask for fabricating semiconductor structures using lithography, comprising: a quartz layer having a number of trenches formed therein, each of said trenches each having a predetermined and programmed defect; and a masking layer running on said quartz layer and masking predetermined regions of said quartz layer for imaging the semiconductor structures.

The teachings of Dettmann et al. differ from those of the applicant in that the applicant teaches the preprogrammed defect is for EUV masks.

White is included here as disclosed above.

It would have been obvious to one having ordinary skill in the art to take the teachings of Dettmann et al. and combine them with the teachings of White in order to make the claimed invention because it is well known that mask failures due the defect propagation on the substrate is more serious in EUV masks.

Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over White (6,042,995) in view of Yan (6,641,959) and Tsukamoto et al. (6,723,475).

White is included here as recited above.

The teachings of White differ from those of the applicant in that the applicant teaches forming the mask layers by sputtering at an angle.

Yan teaches an EUV apparatus comprising: an illumination system adapted to provide radiation; a condenser system adapted to collect said radiation provided by said illumination system; an absorberless phase-shifting mask adapted to reflect said radiation collected by said condenser systems, said absorberless phase-shifting mask comprising: a

substrate: a lower multilayer mirror disposed over said substrate, said lower multilayer mirror having a first region and a second region; a buffer layer disposed over said second region of said lower multilayer mirror; and an upper multilayer mirror disposed over said buffer layer; an imaging system adapted to project said radiation reflected by said absorberless phase-shifting mask; and a wafer adapted to receive said radiation projected by said imaging system.

Yan also teaches that the multilayer is made using sputtering and that if a defect is present it will propagate. [see Detailed Description Text - DETX (8)]

The thickness uniformity of the lower ML mirror 1200 should be better than 0.8% across the substrate 1100. Direct current (DC) magnetron sputtering can deposit the lower ML mirror 1200 conformally with good thickness uniformity although a defect in the substrate 1100 will tend to propagate up through the alternating layers to the top surface of the lower ML mirror 1200.

Alternatively, ion beam deposition (IBD) may be used to smooth over a defect in the substrate 1100 and prevent propagation of the defect to the top surface of the lower ML mirror 1200.

Tsukamoto et al. teach claims 14 and 15, [see Detailed Description Text - DETX (40)]

The reflectance of a multilayer reflection film, formed of the Ru and the Si layers by an ion beam sputtering deposition method, is approximately 70% at an incidence angle of 5.degree.. A decrease in reflectance of a multilayer reflection film, composed of Si layers doped with B at a concentration of 0.02%, is difficult to observe. Electrodes are provided at the periphery of an exposure area 100 by 144 mm on this multilayer film, and an absorption

layer composed of Ni is formed by an electroplating method, thereby forming a reflection-type mask.

It would have been obvious to one having ordinary skill in the art to take the teachings of White and combine them with the teachings of Yan (6,641,959) and Tsukamoto et al. in order to make the claimed invention because it is well known that sputtering gives the best control of layer formation which is more serious when forming reflective layers for EUV lithography.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Rosasco
Primary Examiner
Art Unit 1756

S.Rosasco
09/13/06